AREA OF REVIEW AND CORRECTIVE ACTION PLAN SUMMARY
40 CFR 146.84(b)

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

2.0 Overall Summary of the Area of Review and Corrective Action Plan

The plan deals with delineating the Area of Review (AoR) and provides corrective actions that are needed in the wells that penetrate the upper confining zone within the AoR. Delineation of the AoR is one of the key elements in Class VI Rule to ensure USDWs in the region surrounding the geologic sequestration project may not be endangered by the injection activity.

The AoR is defined as the larger of the maximum extent of the a) free-phase CO_2 plume or b) pressure boundary within which brines from the injection zone can migrate into overlying USDW via leaky wells, faults, or breaches of the confining zone. Both the CO_2 plume and the critical pressure front are determined using a multiphase CO_2-brine transport model, which is constructed from a sophisticated geologic model that accounts for site-specific hydrogeology. The methods and approaches for developing this complex multiphase simulation model and delineating the AoR are defined below.

Control of the pore space, into which the free-phase CO_2 plume is predicted to migrate, is a requirement for a Class VI permit. In Louisiana, the pore space is owned by the surface owner of the land. An agreement has been made with the landowners regarding pore space ownership in the YAMS CO_2 Sequestration Project.

The proposed AoR includes legacy wells, according to the records obtained from LDNR. A detailed analysis was performed to evaluate the risk and timing of the plume and/or pressure front reaching wells inside the AoR, relative to the project schedule, to propose corrective actions and a timeline for these procedures.

Oxy Low Carbon Ventures, LLC will re-evaluate the AoR every five years during the injection and post-injection phases. In addition, monitoring and operational data will be reviewed periodically by Oxy Low Carbon Ventures, LLC during the injection and post-injection phases.

Additional details for the AoR and corrective actions are included in the project Area of Review and Corrective Action Plan document of the permit.

SIMULATOR DESCRIPTION / DOCUMENTATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Simulator Description / Documentation

GEMS V2020.10 was used for the reservoir simulation. A description of the simulator and the settings used for the project is included in Section 2.1.2 Description of Model, in the Area of Review and Corrective Action Plan document of this permit. That document is included in the Confidential Business Information folder.

SIMULATOR DESCRIPTION / DOCUMENTATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Simulator Description / Documentation

GEM V2020.10 was used for the reservoir simulation. A description of the simulator and the settings used for the project is included in Area of Review and Corrective Action Plan document of this permit, titled "03 - AOR_CA_YAMS_CCS_2cbi.pdf". Section 2.1.2 Description of Model is the section containing this information.

The user manual from GEM V2016 has been uploaded to the GSDT as "gm201610en.pdf". This is the last .pdf version of the manual offered by the simulation provider, Computer Modeling Group, Ltd. More recent versions of the manual are offered only as web-based support accessible with program installation. If additional detail is needed on a specific element of the simulator, this information can be copied from the web-based version and provided upon request."

SIMULATOR DESCRIPTION / DOCUMENTATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Simulator Description / Documentation

GEM V2020.10 was used for the reservoir simulation. A description of the simulator and the settings used for the project is included in Area of Review and Corrective Action Plan document of this permit, titled "03 - AOR_CA_YAMS_CCS_1_R2cbi.pdf". Section 2.1.2 Description of Model is the section containing this information.

The user manual from GEM V2016 has been uploaded to the GSDT as "gm201610en.pdf". This is the last .pdf version of the manual offered by the simulation provider, Computer Modeling Group, Ltd. More recent versions of the manual are offered only as web-based support accessible with program installation. If additional detail is needed on a specific element of the simulator, this information can be copied from the web-based version and provided upon request."

ADDITIONAL AoR DELINEATION INFORMATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Additional AoR Delineation Information

This does not apply as no state has primacy in the project area as of submittal.

ADDITIONAL AoR DELINEATION INFORMATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Additional AoR Delineation Information

This does not apply as no state has primacy in the project area as of submittal.

DOMAIN COORDINATES FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Domain Coordinates File

A file with the domain coordinates is included in the project Confidential Business Information file.

DOMAIN COORDINATES FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Domain Coordinates File

A file with the domain coordinates is included in the project Confidential Business Information file.

GRID FILE DESCRIPTION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Grid File Description

See the Eclipse keyword file in the Confidential Business Information file.

GRID FILE DESCRIPTION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Grid File Description

See the Eclipse keyword file in the Confidential Business Information file.

ECLIPSE KEYWORD FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Eclipse Keyword File

See the Eclipse keyword file in the Confidential Business Information file.

ECLIPSE KEYWORD FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Eclipse Keyword File

See the Eclipse keyword file in the Confidential Business Information file.

IMAGE FILE(S) FOR MODEL DOMAIN GRID

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image File(s) for Model Domain Grid

An image file for the model domain grid is included in the Confidential Business Information file.

IMAGE FILE(S) FOR MODEL DOMAIN GRID

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image File(s) for Model Domain Grid

An image file for the model domain grid is included in the Confidential Business Information file.

FILE WITH EOS REFERENCE OR DOCUMENTATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File with EOS Reference or Documentation

The simulation uses the Peng Robinson equation of state, as referenced in section 2.1.2 Description of Model, in the Area of Review and Corrective Action Plan document in the Confidential Business Information file.

FILE DESCRIBING GEOCHEMISTRY MODELING

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File Describing Geochemistry Modeling

Details on the geochemistry modeling are provided in section 2.1.2 Description of Model in the Area of Review and Corrective Action Plan document in the Confidential Business Information file.

FILE DESCRIBING HOW POROSITY WAS DETERMINED AND ASSIGNED TO NUMERICAL MODEL

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File Describing how Porosity was Determined and Assigned to Numerical Model

The porosity was distributed spatially in the geologic model and then directly imported into the numerical model. Details of the porosity distribution is provided as Section 2.4 Porosity and Permeability in the AoR and Corrective Action Plan document in the Confidential Business Information files.

FILE DESCRIBING HOW POROSITY WAS DETERMINED AND ASSIGNED TO NUMERICAL MODEL

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File Describing how Porosity was Determined and Assigned to Numerical Model

The porosity was distributed spatially in the geologic model and then directly imported into the numerical model. Details of the porosity distribution is provided as Section 2.4 Porosity and Permeability in the AoR and Corrective Action Plan document in the Confidential Business Information files.

IMAGE FILES FOR POROSITY DISTRIBUTIONS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image Files for Porosity Distributions

The porosity distribution is imaged as Figure AOR-20 in the AoR and Corrective Action Plan document in the Confidential Business Information file.

IMAGE FILES FOR POROSITY DISTRIBUTIONS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image Files for Porosity Distributions

The porosity distribution is imaged as Figure AOR-23 in the AoR and Corrective Action Plan document in the Confidential Business Information file.

IMAGE FILES FOR POROSITY DISTRIBUTIONS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image Files for Porosity Distributions

The porosity distribution is imaged as Figure AOR-23 in the AoR and Corrective Action Plan document in the Confidential Business Information file.

FILE DESCRIBING HOW PERMEABILITY WAS DETERMINED AND ASSIGNED TO NUMERICAL MDOEL

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File Describing how Permeability was Determined and Assigned to Numerical Model

The permeability was distributed in the geologic model and directly imported into the numerical model. Details on the permeability distribution are included as Section 2.4 Porosity and Permeability in the AoR and Corrective Action Plan document in the Confidential Business Information files.

FILE DESCRIBING HOW PERMEABILITY WAS DETERMINED AND ASSIGNED TO NUMERICAL MDOEL

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File Describing how Permeability was Determined and Assigned to Numerical Model

The permeability was distributed in the geologic model and directly imported into the numerical model. Details on the permeability distribution are included as Section 2.4 Porosity and Permeability in the AoR and Corrective Action Plan document in the Confidential Business Information files.

IMAGE FILES FOR PERMEABILITY DISTRIBUTIONS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image Files for Permeability Distributions

The porosity distribution is imaged as Figure AOR-23 in the AoR and Corrective Action Plan document in the Confidential Business Information file.

IMAGE FILES FOR PERMEABILITY DISTRIBUTIONS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image Files for Permeability Distributions

The porosity distribution is imaged as Figure AOR-26 in the AoR and Corrective Action Plan document in the Confidential Business Information file.

IMAGE FILES FOR PERMEABILITY DISTRIBUTIONS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image Files for Permeability Distributions

The porosity distribution is imaged as Figure AOR-26 in the AoR and Corrective Action Plan document in the Confidential Business Information file.

DESCRIPTION OF ROCK TYPE SELECTION AND ASSIGNMENT

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Description of Rock Type Selection and Assignment

Net sand was distributed using a fractional NTG property. The NTG distribution is described in section 2.4 Porosity and Permeability in the AoR and Corrective Action Plan document in the Confidential Business Information files.

DESCRIPTION OF ROCK TYPE SELECTION AND ASSIGNMENT

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Description of Rock Type Selection and Assignment

Net sand was distributed using a fractional NTG property. The NTG distribution is described in section 2.4 Porosity and Permeability in the AoR and Corrective Action Plan document in the Confidential Business Information files.

ROCK TYPE DISTRIBUTION DATA FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Rock Type Distribution Data File

The rock type distribution data file is included as NTG_Keyword_File_cbi.txt in the Confidential Business Information file.

ROCK TYPE DISTRIBUTION DATA FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Rock Type Distribution Data File

The rock type distribution data file is included as NTG_Keyword_File_cbi.txt in the Confidential Business Information file.

IMAGE FILES FOR ROCK TYPE DISTRIBUTION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image Files for Rock Type Distribution

An image file for the rock type distribution is included in the project Confidential Business information file.

IMAGE FILES FOR ROCK TYPE DISTRIBUTION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Image Files for Rock Type Distribution

An image file for the rock type distribution is included in the project Confidential Business information file.

FILE FOR AQUEOUS SATURATION VS CAPILLARY PRESSURE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Aqueous Saturation vs Capillary Pressure

Capillary pressure tables are included in RelPerm_Pc_Tables_cbi.txt file in the confidential business information.

FILE FOR AQUEOUS SATURATION VS CAPILLARY PRESSURE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Aqueous Saturation vs Capillary Pressure

Capillary pressure tables are included in RelPerm_Pc_Tables_cbiv2.xlsx file in the confidential business information.

FILE FOR AQUEOUS SATURATION VS CAPILLARY PRESSURE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Aqueous Saturation vs Capillary Pressure

Capillary pressure tables are included in RelPerm_Pc_Tables_cbiv2.xlsx file in the confidential business information.

FILE FOR AQUEOUS RELATIVE PERMEABILITY

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Aqueous Relative Permeability

Aqueous relative permeability tables are included in RelPerm_Pc_Tables_cbi.txt file in the confidential business information

FILE FOR AQUEOUS RELATIVE PERMEABILITY

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Aqueous Relative Permeability

Aqueous relative permeability tables are included in RelPerm_Pc_Tables_cbi v2.xlsx file in the confidential business information

FILE FOR AQUEOUS RELATIVE PERMEABILITY

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Aqueous Relative Permeability

Aqueous relative permeability tables are included in RelPerm_Pc_Tables_cbi v2.xlsx file in the confidential business information

FILE FOR GAS RELATIVE PERMEABILITY

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Gas Relative Permeability

Gas relative permeability tables are included in RelPerm_Pc_Tables_cbi.txt file in the confidential business information.

FILE FOR GAS RELATIVE PERMEABILITY

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Gas Relative Permeability

Gas relative permeability tables are included in RelPerm_Pc_Tables_cbiv2.xlsx file in the confidential business information.

FILE FOR GAS RELATIVE PERMEABILITY

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File for Gas Relative Permeability

Gas relative permeability tables are included in RelPerm_Pc_Tables_cbiv2.xlsx file in the confidential business information.

BOUNDARY CONDITIONS DESCRIPTION FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Boundary Conditions Description File

The boundary conditions are described in Section 2.6 Boundary Conditions in the Area of Review and Corrective Action Plan document. This document is found in the Confidential Business Information file.

BOUNDARY CONDITIONS DESCRIPTION FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Boundary Conditions Description File

The boundary conditions are described in Section 2.6 Boundary Conditions in the Area of Review and Corrective Action Plan document. This document is found in the Confidential Business Information file.

TIME-SERIES FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Time-Series File

A time-series file is included in the Confidential Business Information file.

TIME-SERIES FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Time-Series File

A time-series file is included in the Confidential Business Information file.

SNAPSHOT FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Snapshot File

Snapshot data is included in the Confidential Business Information file.

SNAPSHOT FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Snapshot File

Snapshot data is included in the Confidential Business Information file.

SURFACE FLUX FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Surface Flux File

Surface flux data is not applicable to the project model.

SURFACE FLUX FILE

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Surface Flux File

Surface flux data is not applicable to the project model.

SENSITIVITY ANALYSIS DESCRIPTION / RESULTS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Sensitivity Analysis Description / Results

A description of the sensitivity analysis is included in section 3.2.1 Sensitivity to Input Parameters in the Area of Review and Correction Action Plan document in the Confidential Business Information file.

SENSITIVITY ANALYSIS DESCRIPTION / RESULTS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Sensitivity Analysis Description / Results

A description of the sensitivity analysis is included in section 3.2.1 Sensitivity to Input Parameters in the Area of Review and Correction Action Plan document in the Confidential Business Information file.

FILE DESCRIBING CRITICAL PRESSURE ESTIMATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File Describing Critical Pressure Estimation

The calculation method for the critical pressure estimation is described in section 4.1 Critical Pressure Calculations in the Area of Review and Corrective Action Plan document in the Confidential Business Information file.

FILE DESCRIBING CRITICAL PRESSURE ESTIMATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File Describing Critical Pressure Estimation

The calculation method for the critical pressure estimation is described in section 4.1 Critical Pressure Calculations in the Area of Review and Corrective Action Plan document in the Confidential Business Information file.

SHAPEFILE OR KML FILE SHOWING DELINEATED AoR

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Shapefile or KML File Showing Delineated AoR

A shapefile showing the delineated Area of Review is included in the Confidential Business Information file.

SHAPEFILE OR KML FILE SHOWING DELINEATED AoR

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Shapefile or KML File Showing Delineated AoR

A shapefile showing the delineated Area of Review is included in the Confidential Business Information file.

FILE WITH LOCATION OF ALL PENETRATIONS WITHIN AOR

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File with Location of All Penetrations within AOR

The Area of Review and Corrective Action Plan document of this permit is included in the project Confidential Business Information file and has details of all penetrations within the Area of Review (AOR).

A file named 1101_Location_Penetrations_AOR_YAMScbi.kml with the location of all penetrations within the AOR is included in the project Confidential Business Information file and includes any oil and gas or water wells.

FILE WITH LOCATION OF ALL PENETRATIONS WITHIN AOR

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File with Location of All Penetrations within AOR

The Area of Review and Corrective Action Plan document of this permit is included in the project Confidential Business Information file and has details of all penetrations within the Area of Review (AOR).

A file named 1101_Location_Penetrations_AOR_YAMScbi.kml with the location of all penetrations within the AOR is included in the project Confidential Business Information file and includes any oil and gas or water wells.

FILE WITH LOCATION OF WELLS REQUIRING CORRECTIVE ACTION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File with Location of Wells Requiring Corrective Action

The Area of Review and Corrective Action Plan document of this permit is included in the project Confidential Business Information file and has details of wells requiring corrective action.

A file named 1102_Location_Corrective_Action_YAMScbi.kml with the location of wells requiring corrective action is included in the project Confidential Business Information file.

FILE WITH LOCATION OF WELLS REQUIRING CORRECTIVE ACTION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 File with Location of Wells Requiring Corrective Action

The Area of Review and Corrective Action Plan document of this permit is included in the project Confidential Business Information file and has details of wells requiring corrective action.

A file named 1102_Location_Corrective_Action_YAMScbi.kml with the location of wells requiring corrective action is included in the project Confidential Business Information file.

SUPPORTING DOCUMENTATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Supporting Documentation

Details of the corrective action plan are included in the Area of Review and Corrective Action Plan document of the permit.

SUPPORTING DOCUMENTATION

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Supporting Documentation

Details of the corrective action plan are included in the Area of Review and Corrective Action Plan document of the permit.

APPENDICES AND SUPPORTING MATERIALS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Appendices and Supporting Materials

The Area of Review and Corrective Action Plan document of this permit is included in the project Confidential Business Information file. No appendices and supporting materials are provided.

APPENDICES AND SUPPORTING MATERIALS

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 2 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

This document was created to satisfy requirements of the Geologic Sequestration Data Tool (GSDT) Area of Review and Corrective Action module.

2.0 Appendices and Supporting Materials

The Area of Review and Corrective Action Plan document of this permit is included in the project Confidential Business Information file. No appendices and supporting materials are provided.

AREA OF REVIEW AND CORRECTIVE ACTION PLAN SUMMARY
40 CFR 146.84(b)

YAMS CO_2 Sequestration Project

1.0 Facility Information

Facility name: YAMS CO_2 Sequestration Project
YAMS CCS 1 Well

Facility contact: Kelly Watson, Project Manager
5 Greenway Plaza Houston, TX 77046
713-552-8613 kelly_watson@oxy.com

Well location: [redacted], Louisiana

2.0 Overall Summary of the Area of Review and Corrective Action Plan

The plan deals with delineating the Area of Review (AoR) and provides corrective actions that are needed in the wells that penetrate the upper confining zone within the AoR. Delineation of the AoR is one of the key elements in Class VI Rule to ensure USDWs in the region surrounding the geologic sequestration project may not be endangered by the injection activity.

The AoR is defined as the larger of the maximum extent of the a) free-phase CO_2 plume or b) pressure boundary within which brines from the injection zone can migrate into overlying USDW via leaky wells, faults, or breaches of the confining zone. Both the CO_2 plume and the critical pressure front are determined using a multiphase CO_2-brine transport model, which is constructed from a sophisticated geologic model that accounts for site-specific hydrogeology. The methods and approaches for developing this complex multiphase simulation model and delineating the AoR are defined below.

Control of the pore space, into which the free-phase CO_2 plume is predicted to migrate, is a requirement for a Class VI permit. In Louisiana, the pore space is owned by the surface owner of the land. An agreement has been made with the landowners regarding pore space ownership in the YAMS CO_2 Sequestration Project.

The proposed AoR includes legacy wells, according to the records obtained from LDNR. A detailed analysis was performed to evaluate the risk and timing of the plume and/or pressure front reaching wells inside the AoR, relative to the project schedule, to propose corrective actions and a timeline for these procedures.

Oxy Low Carbon Ventures, LLC will re-evaluate the AoR every five years during the injection and post-injection phases. In addition, monitoring and operational data will be reviewed periodically by Oxy Low Carbon Ventures, LLC during the injection and post-injection phases.

Additional details for the AoR and corrective actions are included in the project Area of Review and Corrective Action Plan document of the permit.

Class VI UIC Area of Review and Corrective Action

This submission is for:

Project ID: R06-LA-0004

Project Name: YAMS CO2 Sequestration Project

Current Project Phase: Pre-Injection Prior to Construction

Overview

Simulator Used for AoR delineation modeling: GEM

Version Used: 2020.10

Simulator Description/Documentation: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0201_Simulator_Description_Documentation_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0201_Simulator_Description_Documentation_YAMSv2.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0201_Simulator_Description_Documentation_YAMS_CCS2.pdf

Total Simulation Time From Start of Injection: 44194 days

Additional AoR Delineation Information: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0202_Add_AOR_Delineation_Info_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0202_Add_AOR_Delineation_Info_YAMS_CCS2.pdf

Description of Information Submitted: This does not apply as no state has primacy in the project area as of submittal.

Model Domain

Coordinate System: State Plane

Horizontal Datum: NAD83

Coordinate System Units: ft

Vertical Datum: Mean Sea Level

Describe Vertical Datum: All grid and well depths in TVDSS

Zone: Louisiana South

FIPSZONE: 1702 ADSZONE: 4501

Mesh Type: Other

Describe Mesh Type: corner-point grid

Domain Size in Global Units Specified Above

Domain Coordinates File: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0301_Domain_Coordinates_File_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0301_Domain_Coordinates_File_YAMS_CCS2.pdf

Grid Size

Number of Nodes in x: 110 y: 173 z: 236

Grid Spacing: Constant

Grid Spacing in x: 500 y: 500 z: 10

Grid File Format: Eclipse Keyword File

Grid File Description: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0302_Grid_File_Description_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0302_Grid_File_Description_YAMS_CCS2.pdf

Eclipse Keyword File: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0303_Eclipse_Keyword_File_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0303_Eclipse_Keyword_File_YAMS_CCS2.pdf

Faults Modeled: No

Caprock Modeled: No

Image File(s) for Model Domain Grid: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0304_Image_File_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0304_Image_File_YAMS_CCS2.pdf

Processes Modeled by Simulator

Reservoir Conditions:

Supercritical CO2 Conditions

Phases Modeled:

Aqueous Supercritical CO2

Aqueous Phase:

Phase Compressibility: Compressible

Compressibility Value: 0.000003 1/psi

Phase Composition: Non-Compositional

Supercritical CO2 Phase:

Phase Compressibility: Compressible

Phase Composition: Compositional

Supercritical CO2 Phase Components:

CO2 Methane

Equation of State Description Including Reference: Peng-Robinson EOS

File with EOS Reference or Documentation: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0401_File_with_EOS_YAMS.pdf

Multifluid Flow Processes:

Advection Buoyancy

Non-wetting Fluid Trapping Pore Compressibility

Thermal Conditions: Isothermal

Heat Transport Processes:

Geochemistry Modeled: Yes

File Describing Geochemistry Modeling: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0402_File_Describing_Geochemistry_Modeling_YAMS.pdf

Geomechanical/Structural Deformations Modeled: No

Rock Properties and Constitutive Relationships

Porosity/Permeability Model

Single Porosity

Porosity Distribution: Heterogeneous

Porosity included in Eclipse Keyword File: Yes

Porosity Variable Name in Eclipse Keyword File: POR

File Describing how Porosity was Determined and Assigned to Numerical Model: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0501_Porosity_Determined_Assigned_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0501_Porosity_Determined_Assigned_YAMS_CCS2.pdf

Image Files for Porosity Distributions: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0502_Image_Files_Porosity_Distribution_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0502_Image_Files_Porosity_Distribution_YAMSv2.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0502_Image_Files_Porosity_Distribution_YAMS_CCS2.pdf

Permeability Distribution: Heterogeneous

Permeability included in Eclipse Keyword File: Yes

Permeability Variable Name in Eclipse Keyword File: PERMI

File Describing how Permeability was Determined and Assigned to Numerical Model: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0503_Permeability_Determined_Assigned_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0503_Permeability_Determined_Assigned_YAMS_CCS2.pdf

Image Files for Permeability Distributions: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0504_Image_Files_Permeability_Distribution_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0504_Image_Files_Permeability_Distribution_YAMSv2.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0504_Image_Files_Permeability_Distribution_YAMS_CCS2.pdf

Number of Rock Types Modeled: 1

Description of Rock Type Selection and Assignment: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0505_Description_Rock_Type_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0505_Description_Rock_Type_YAMS_CCS2.pdf

Rock Type Distribution Data File: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0506_Rock_Type_Distribution_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0506_Rock_Type_Distribution_YAMS_CCS2.pdf

Image Files for Rock Type Distribution: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0507_Image_Files_Rock_Type_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0507_Image_Files_Rock_Type_YAMS_CCS2.pdf

Rock Type #1

Rock Compressibility: Pore

Rock Compressibility Distribution: Single Value

Compressibility Value: 0.000005 1/Pa

Compressibility included in Eclipse Keyword File: Yes

Compressibility Variable Name in Eclipse Keyword File: CPOR

Constitutive Relationships

Aqueous Saturation vs. Capillary Pressure: Table

Tabular Format File for Aqueous Saturation vs Capillary Pressure: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0508_Aqueous_Sat_Cap_Press_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0508_Aqueous_Sat_Cap_Press_YAMSv2.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0508_Aqueous_Sat_Cap_Press_YAMS_CCS2.pdf

Aqueous Trapped Gas Modeled: Yes

Hysteresis other than non-wetting fluid trapping: No

Aqueous Relative Permeability: Table

Tabular Format File for Aqueous Relative Permeability: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0509_Aqueous_Relative_Perm_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0509_Aqueous_Relative_Perm_YAMSv2.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0509_Aqueous_Relative_Perm_YAMS_CCS2.pdf

Hysteresis other than non-wetting fluid trapping: No

Gas Relative Permeability: Table

Tabular Format File for Gas Relative Permeability: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0510_Gas_Relative_Perm_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0510_Gas_Relative_Perm_YAMSv2.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0510_Gas_Relative_Perm_YAMS_CCS2.pdf

Hysteresis other than non-wetting fluid trapping: No

Porosity and Permeability Reduction Due to Salt Precipitation

Boundary Conditions

Attach Boundary Conditions Description File: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0601_Boundary_Conditions_Description_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0601_Boundary_Conditions_Description_YAMS_CCS2.pdf

Initial Conditions

Initial Phases in Domain: Aqueous

Initial Aqueous Pressure: Varying with Depth, Temperature, and Salinity

Initial Aqueous Pressure: -999 MPa at Reference Elevation: -999 m

Initial Temperature: Varying with Depth

Initial Temperature: -999 C at Reference Elevation: -999 m Gradient: -999 deg C/m

Initial Salinity: Spatially Constant

Initial Salinity: -999 mg/L

Initial Condition Comments: The initial conditions can be found in the AoR and Corrective Action Plan in the confidential business information.

Operational Information

Number of Injection Wells: -999

Number of Production/Withdrawal Wells: -999

Model Output/Results

Provide file name and corresponding spatial location for each file: See Confidential Business Information file for Time Series information.

Time-Series File: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0901_Time_Series_File_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0901_Time_Series_File_YAMS_CCS2.pdf

Provide file name and corresponding variable and time stamp for each file: See Confidential Business Information file for snapshot data information.

Snapshot File: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0902_Snapshot_File_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0902_Snapshot_File_YAMS_CCS2.pdf

Provide file name and corresponding description of surface for each file: This is not applicable.

Surface Flux File: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0903_Surface_Flux_File_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0903_Surface_Flux_File_YAMS_CCS2.pdf

Sensitivity Analysis Description/Results: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0904_Sensitivity_Analysis_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/0904_Sensitivity_Analysis_YAMS_CCS2.pdf

AoR Pressure Front Delineation

Lowermost USDW:

Name of Lowermost USDW: -999

Water Density: -999 kg/m^3 at Elevation: -999 m

Location of Measurement for Density: -999

Temperature: -999 C at Elevation: -999 m

Location of Measurement: -999

Pressure: -999 MPa at Elevation: -999 m

Location of Measurement: -999

Salinity: -999 mg/L at Elevation: -999 m

Location of Measurement: -999

Elevation of bottom of USDW: -999 m

Injection Zone:

Name of Injection Zone: -999

Water Density: -999 kg/m^3 at Elevation: -999 m

Location of Measurement: -999

Temperature: -999 C at Elevation: -999 m

Location of Measurement: -999

Pressure: -999 MPa at Elevation: -999 m

Location of Measurement: -999

Salinity: -999 mg/L at Elevation: -999 m

Location of Measurement: -999

Elevation of top of Injection Zone: -999 m

Method of Estimating Critical Pressure: Static Mass Balance

Assumptions: linear density gradient

File Describing Critical Pressure Estimation: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1001_Critical_Pressure_Estimation_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1001_Critical_Pressure_Estimation_YAMS_CCS2.pdf

Estimated Critical Pressure: 32 MPa

Delineated AoR:

Shapefile or KML File Showing Delineated AoR: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1002_Shape_Delineated_AOR_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1002_Shape_Delineated_AOR_YAMS_CCS2.pdf

Corrective Action

File with Location of All Penetrations within AoR: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1101_Location_Penetrations_AOR_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1101_Location_Penetrations_AOR_YAMS_CCS2.pdf

File with Location of Wells Requiring Corrective Action: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1102_Location_Corrective_Action_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1102_Location_Corrective_Action_YAMS_CCS2.pdf

Supporting Documentation: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1103_Supporting_Documentation_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1103_Supporting_Documentation_YAMS_CCS2.pdf

Area of Review and Corrective Action Plan [40 CFR 146.82(a)(13) and 146.84(b) or applicable state requirements]

Are you making an Area of Review and Corrective Action Plan submission at this time?: Yes

Reason for Project Plan Submission: Permit application submission

Project Plan Upload

Attach the Area of Review and Corrective Action Plan: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/AOR_CA_YAMS_CCS_1g.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/03-----AOR_CA_YAMS_CCS_2g.pdf

Appendices and Supporting Materials Upload

Attach Any Supporting Documentation for the AoR and Corrective Action Plan: https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-1133/1202_Appendices_Supporting_Materials_YAMS.pdf

https://gsdt.pnnl.gov/alfresco/service/velo/getFile/no_wiki/shared/Submissions/R06-LA-0004/Phase1-PreConstruction/AoRModeling-11-30-2021-

1133/1202_Appendices_Supporting_Materials_YAMS_CCS2.pdf

Area of Review Reevaluation [40 CFR 146.84(e) or applicable state requirements]

Minimum fixed frequency of AoR reevaluation: 5 Years

Are you making an Area of Review reevaluation submission at this time?: No

Reevaluation Background

Reevaluation Materials

Please upload your amended AoR and Corrective Action Plan on the previous tab.

Complete Submission

Authorized submission made by: Kelly Watson

Comments regarding this submission: 11/30/21: Added documentation for CCS 2.

For confirmation a read-only copy of your submission will be emailed to: Kelly_Watson@oxy.com